

## Description

# MACHINE GUN MOUNT

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit under 35 USC 119(e) of provisional application 60/481445, filed September 30, 2003, the entire file wrapper contents of which provisional application are herein incorporated by reference as though fully set forth at length.

### FEDERAL RESEARCH STATEMENT

[0002] The inventions described herein may be manufactured, used and licensed by or for the U.S. Government for U.S. Government purposes.

### BACKGROUND OF INVENTION

[0003] It will be appreciated that there are obvious advantages to being able to stow a machine gun completely within a helicopter without breaking down the machine gun or removing the components parts. Existing machine gun mounts for helicopters such as the UH-60 Black Hawk Helicopter cannot be stowed away because of interference

problems with the crew seat, fire extinguisher and the inside of the fuselage. The existing mounting system also fails to meet weapon dispersion requirements. A further disadvantage of the existing system is that the system magazine has limited capacity (200 rounds) and the spent case catch bag interferes with the machine gun mount post making it difficult to transverse the post as the catch bag fills with empty cases and links.

#### SUMMARY OF INVENTION

- [0004] In accordance with the invention, there is provided a machine gun mounting arrangement our mount which enables mounting of a machine gun, such as the M240 machine gun, on a helicopter and which also enables the machine gun to be completely stowed within the helicopter without removing any component parts and without any interference with existing components of the aircraft (such as the inside of the fuselage) or with other stowed equipment (such as a fire extinguisher) or with the aircraft crew members (e.g., by interfering with the crew seat).
- [0005] In accordance with one aspect of the invention, there is provided a machine gun mount for mounting a machine gun in a movable support arm of a helicopter, the mount comprising:

- [0006] a gun cradle adapted to be detachably connected to a machine gun;
- [0007] a pintle including means at one end thereof adapted to pivotably mount the pintle, and thus the mount, on the movable support arm so as to enable pivoting movement of the mount, and thus a machine gun mounted in the gun cradle, in a horizontal plane, said pintle being pivotably connected at an opposite end thereof to said gun cradle so as to permit the gun cradle, and thus a machine gun mounted in the gun cradle, to be rotated in a vertical plane through 90° between a first, operative position and a second, stowed position;
- [0008] locking means for locking the gun cradle in the stowed position;
- [0009] a magazine attached to one side of the gun cradle;
- [0010] a spent case and link frame attached to the opposite side of the gun cradle;
- [0011] a spent case and link catch bag connected to and supported by said frame; and
- [0012] a spend case and link deflector supported by said mount and disposed so as to deflect spent cases and links ejected from a machine gun mounted in the gun cradle away from the machine gun to one side thereof.

- [0013] In accordance with an important feature, the magazine includes a lower inwardly projecting portion disposed below the cradle.
- [0014] Preferably, the gun cradle includes first and second axially spaced mounting elements on said one side and the magazine includes a pair of mounting brackets secured to the mounting elements.
- [0015] The gun cradle preferably includes first and second transversely spaced lugs adapted to support a machine gun on the mount.
- [0016] Advantageously, the gun cradle includes transversely spaced first and second mounting members extending oppositely from said first and second lugs for supporting said opposite end of the pintle.
- [0017] In accordance with a further aspect of the invention, there is provided a machine gun mount for mounting a machine gun in a movable support arm of a helicopter, the mount comprising:
  - [0018] a gun cradle adapted to be releasably connected to the machine gun;
  - [0019] a pintle including means at one end thereof adapted to pivotably mount the pintle, and thus the mount, on the movable support arm so as to enable pivoting movement

of the mount, and thus a machine gun mounted in the gun cradle, in a horizontal plane, said pintle being pivotably connected at an opposite end thereof to said gun cradle so as to permit the gun cradle, and thus a machine gun mounted in the gun cradle, to be rotated in a vertical plane through 90° between a first, operative position and a second, stowed position;

- [0020] retaining means for retaining the gun cradle in the stowed position;
- [0021] a magazine attached to one side of the gun cradle, said magazine including a lower inwardly projecting portion disposed below said cradle;
- [0022] a spent case and link frame attached to the opposite side of the gun cradle; and
- [0023] a spent case and link bag connected to and supported by said frame.
- [0024] Preferably, the gun cradle includes first and second transversely spaced lugs and cooperating quick release pins adapted to releasably connect a machine gun to the mount.
- [0025] According to yet another aspect of the invention, there is provided a machine gun mount for mounting a machine gun in a movable support arm of a helicopter, said mount

comprising:

- [0026] a gun cradle adapted to be detachably connected to a machine gun, said cradle including first and second axially spaced mounting elements on said one side and first and second transversely spaced lugs adapted to support the machine gun on the mount;
- [0027] a pintle including means at one end thereof adapted to pivotably mount the pintle, and thus the mount, on the movable support arm so as to enable pivoting movement of the mount, and thus a machine gun mounted in the gun cradle, in a horizontal plane, said pintle being pivotably connected at an opposite end thereof to said gun cradle so as to permit the gun cradle, and thus a machine gun mounted in the gun cradle, to be rotated in a vertical plane through 90° between a first, operative position and a second, stowed position;
- [0028] locking means for locking the gun cradle in the stowed position;
- [0029] a magazine attached to one side of the gun cradle, said magazine including a lower inwardly projecting portion disposed below said gun cradle and said magazine further including a pair of mounting brackets secured to said mounting elements of said gun cradle;

- [0030] a spent case and link frame attached to the opposite side of the cradle mount;
- [0031] a spent case and link bag connected to and supported by said frame.
- [0032] Further features and advantages of the present invention will be set forth in, or apparent from, the detailed description of preferred embodiments thereof which follows.

#### **BRIEF DESCRIPTION OF DRAWINGS**

- [0033] Figure 1 is an exploded perspective view of a weapon mount constructed in accordance with a preferred embodiment of the invention;
- [0034] Figure 2 is a perspective view of the mount of Figure 1, in an assembled state; and
- [0035] Figure 3 is a side elevational view of the mount of Figures 1 and 2, showing a machine gun mounted thereon.

#### **DETAILED DESCRIPTION**

- [0036] Referring particularly to Figures 1 and 2, there is shown a machine gun mount constructed in accordance with a preferred embodiment of the invention. The mount, which is generally denoted 10, includes the following major components which are best seen in the exploded perspective view provided in Figure 1; a gun cradle 12; a pintle 14; a

travel lock mechanism 16; a magazine 18; a spent case and link frame 20; a spent case and link frame catch bag 22; and a spent case deflector 24, all of which are described in more detail below.

- [0037] The gun cradle 12 acts as the interface between the machine gun (not shown in Figures 1 and 2 but denoted MG in Figure 3) and the other mount components. Cradle 12 is preferably a casting made of a high strength steel. The cradle 12 includes parallel body portions 12a and 12b which define a pair of upwardly extending (as viewed in Figure 1) lugs 12c and 12d and a pair of downwardly extending (as viewed in Figure 1) lugs 12e and 12f.
- [0038] Upper lugs 12c, 12d support the machine gun MG as shown in Figure 3, with gun MG being attached thereto with two quick release pins (one of which denoted 26 is shown in Figure 3).
- [0039] Lower lugs 12e and 12f pivotably support one end of pintle 14 as is shown in Figures 2 and 3 and as is described in more detail below.
- [0040] Portion 12a of cradle 12 also includes a pair of upright or outwardly extending mounting elements 21g and 12h located on one side of cradle 12. Mounting elements 12g, 12h are used to support magazine 18, as is perhaps best

seen in Figure 2, and as is described in more detail below.

- [0041] An opening 12i defined by (between) portions 12a and 12b of cradle 12 is adapted to be disposed below the case and link ejector region of machine gun MG as is discussed in more detail below.
- [0042] Turning to pintle 14, pintle 14 serves as the interface between the gun cradle 12 and a movable arm (not shown) for mounting the machine gun MG. For the machine gun used on a UH-60 Black Hawk helicopter, the arm (not shown) is a M144 arm attached to the window frame (not shown) of the helicopter. This arm arrangement is conventional and forms no part of the present invention.
- [0043] A pivot element 14a at the lower end of pintle 14 is pivotably received in the above-mentioned movable arm (not shown) so that pintle 14 can pivot in the arm so as to allow machine gun MG to be pivoted horizontally, i.e., traversed in the horizontal plane.
- [0044] The cradle 12 is connected to the top end 14b of pintle 14, and in a preferred embodiment, a quick release pin 28 (see Figure 3) is used to connect the pintle 14 to lugs 12e, 12f of cradle 12. Pin 28 provides a pivot axis which allows the machine gun MG to be vertically elevated and depressed, i.e., rotated in the vertical plane. The pintle 14

has a depression limit of 90 degrees (in contrast to the about 70 degrees of depression permitted by the existing mounts mentioned above), and this feature enables the machine gun MG to be stowed completely inside the aircraft and away from the operator (in contrast to the existing mounts wherein, because of the depression limit of about 70 degrees, the gun, when stowed, would not clear the operator's seat).

- [0045] A recess 14c at the upper end 14b receives a tab 16a of the travel lock mechanism 16. As is perhaps best seen in Figure 1, travel lock mechanism 16 is of a generally L-shaped configuration with tab 16a being disposed on one leg of the L. When the machine gun MG is fully depressed, a tab (not shown) in the gun cradle 12 moves into the pin-tle 14 and travel lock tab 16a is rotated 90 degrees so as to engage in a locking position and thus lock the machine gun MG in a vertical, muzzle down position for stowage. Although the use of a travel lock mechanism such as travel lock mechanism 16 has important advantages, other locking or retaining means can be used.
- [0046] Turning to the magazine 18, as indicated above, magazine 18 is attached to the gun cradle 12 and includes a pair of mounting brackets 18a and 18b for this purpose.

In a preferred embodiment, four bolts 39 (see Figure 3) and associated washers (not shown) are used to connect brackets 18a, 18b to mounting elements 12g, 12h, with the bolts 30 extending through aligned holes in brackets 18a, 18b and in mounting elements 12g, 12h. The shape or configuration of magazine 18 is important and, in this regard, an inwardly extending portion 18c is provided which maximizes capacity while minimizing the space required by occupying some of the space under the cradle 12. In a preferred embodiment, magazine 18 has a capacity of 300 linked rounds and is made of sheet steel.

- [0047] The spend case and link frame 20 is basically conventional and is attached to cradle 12 by means of the inwardly extending portion 20a in which part of cradle 12 rests, using four attaching bolts (not shown). Portion 20a defines an opening 20b in alignment with the central opening 12i in gun cradle 12 through which spent cases and links fall after being ejected from machine gun MG. The frame 20 is preferably a sheet steel weldment. Two holes 20c and 20d in the top of frame 20 enable the operator to quickly determine whether the spent case bag 22 is full and thus needs emptying. Again, the frame 20 is similar to an existing frame in an existing mount.

[0048] The spent case and link catch bag 22 is also similar to many existing catch bags. The bag 22 attaches to frame 20 as shown in Figures 2 and 3. Bag 22 is preferably made of canvas and preferably includes a hooks and loops (VELCRO®) closure at the bottom thereof for quick emptying when full. In the preferred embodiment under consideration, the bag 22 is designed to hold at least 300 cases and links.

[0049] The spent case deflector 24, which is preferably constructed of sheet metal, is attached to the innermost wall of portion 20a of frame 20 with two attaching bolts (not shown). Deflector 24 is used to deflect empty cases as they are ejected out of the bottom of the machine gun MG, to the right as shown in the drawings, into the catch bag 22. This prevents the cases from bouncing back up into the gun MG, which could potentially cause a malfunction.

[0050] It is noted that the mount 10 is not recoil attenuated, i.e., it is a "hard" mount, in contrast to the attenuated, "soft" mount of the prior art mentioned above. In this regard, in a soft mount, the weapon is allowed to translate axially, i.e., along the axis of the barrel, and this means that the machine gun is constantly moving back and forth as the

gun is being fired so that the hands and arms of the operator are moving back and forth as well. The hard mount construction of mount 10 eliminates this, thereby further enhancing accuracy.

- [0051] In the preferred embodiment under consideration, the machine gun MG is stowed by folding the above-mentioned M144 arm (not shown) and rotating the arm into the window of the helicopter. As discussed above, the construction of mount 10 permits the gun MG to depress through an angle of 90 degrees, thereby enabling the gun MG to swing clear of the crew seat and to stow out of the way of the operator in an area between the operator and the pilot's seat.
- [0052] It is also noted that the mount described above can be readily adapted to other airframes than that discussed previously. The bottom portion 14a of pintle 14, which is adapted to interface with the M144 arm as described hereinbefore, could require modification dependent on the interface requirements of the host aircraft platform.
- [0053] Although the invention has been described above in relation to preferred embodiments thereof, it will be understood by those skilled in the art that variations and modifications can be effected in these preferred embodiments

without departing from the scope and spirit of the invention.